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Strom Thurmond Institute



Lake Thurmond Economic Impact Analysis

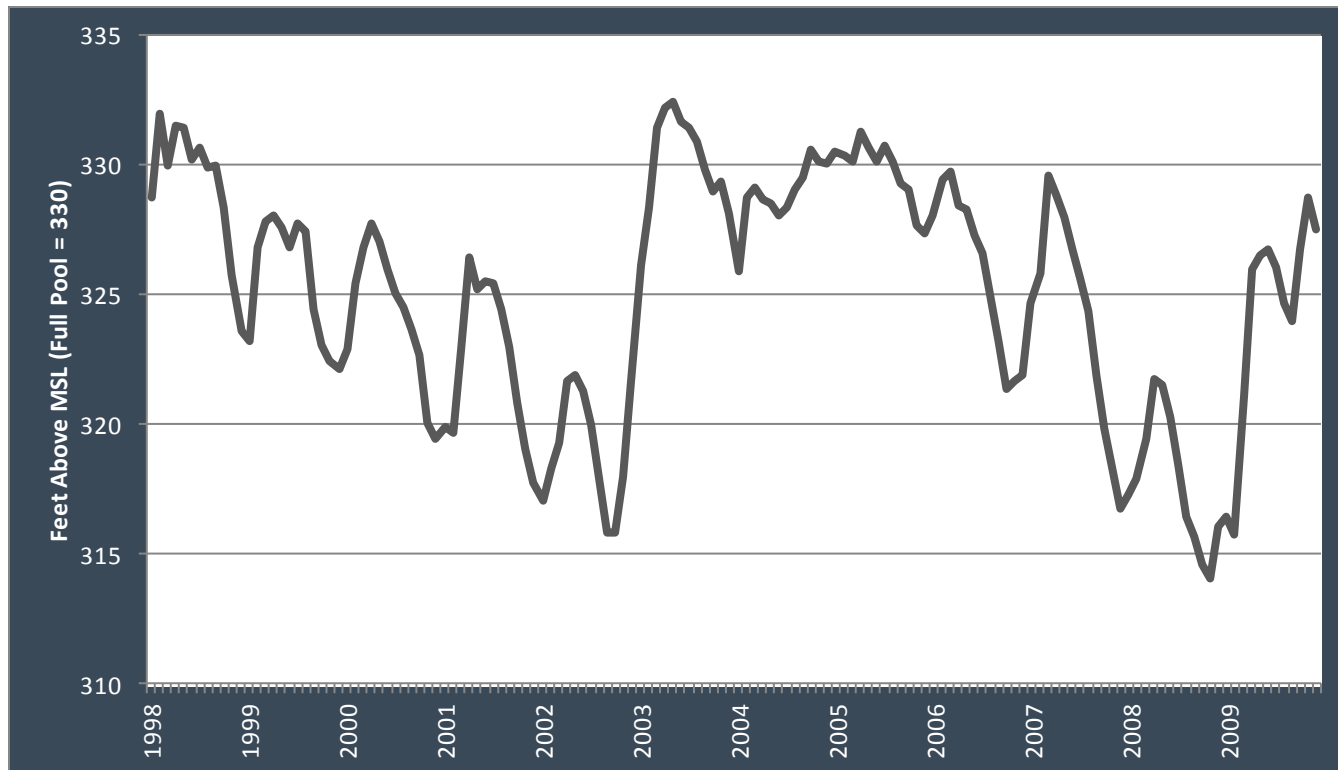
**Climate Connection Workshop
December 5, 2012**

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Research Question

- Do changing lake levels have a measurable economic impact on the six counties that border Lake Thurmond?
 - Columbia
 - Elbert
 - Lincoln
 - McCormick
 - McDuffie
 - Wilkes

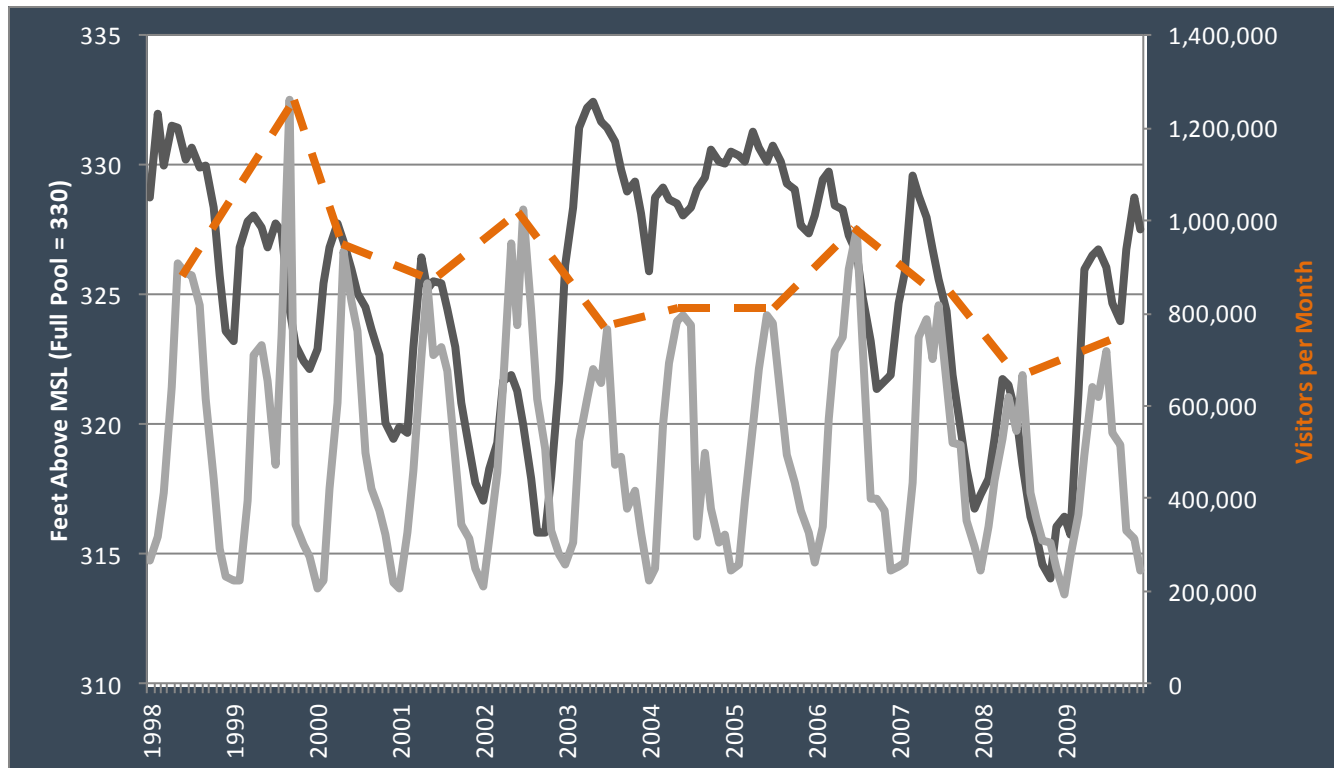
Thurmond Lake Levels (1998-2009)



Lake Level vs. Recreation Visits (1998-2009)

Average per month = 505,242

Marginal effect of 1-foot increase = 11,048 (2.2%)





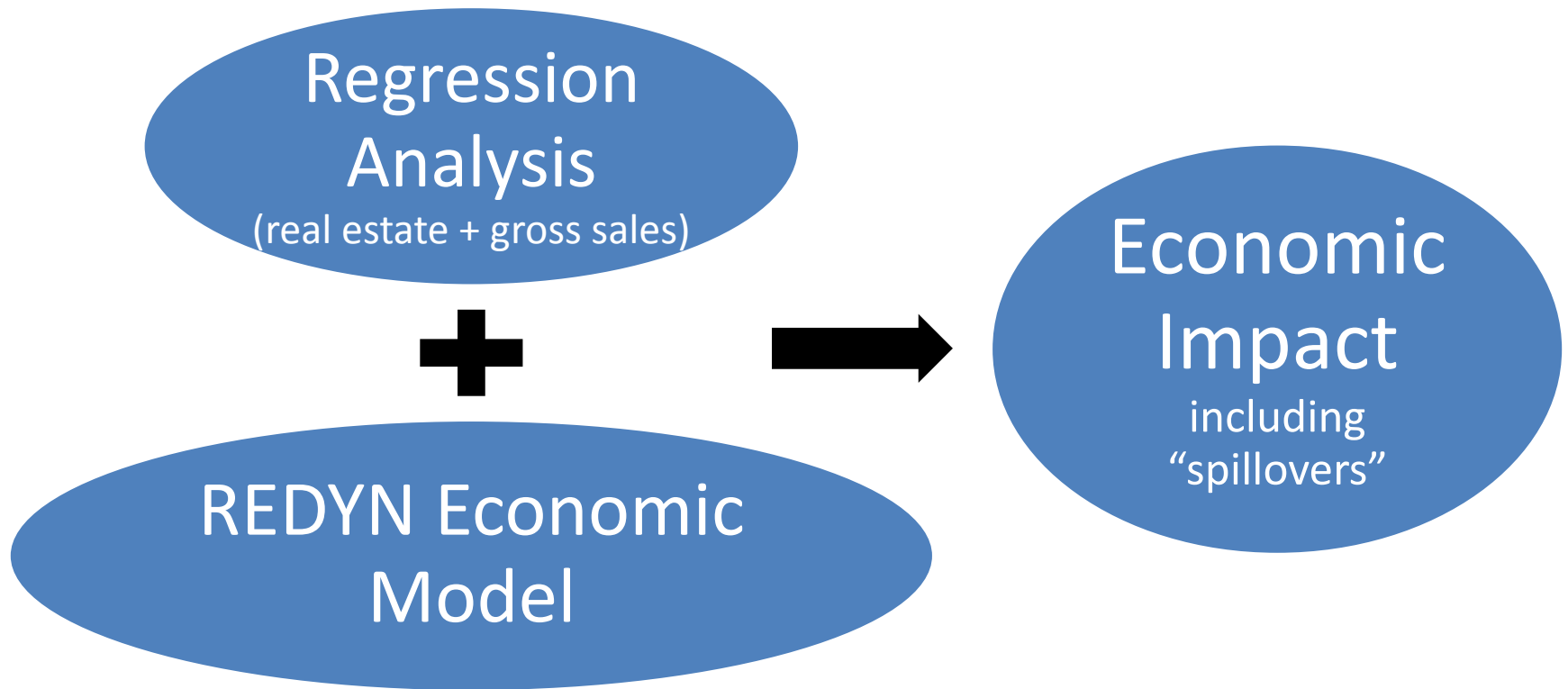
Gross Sales and Real Estate Transactions

Gross Sales and Lake Level

(linear regression model)

- Selected business categories (SIC codes) that are most likely to be affected by lake levels.
- Used those with statistically significant correlations with lake level.
- Some businesses may be impacted positively by lake levels (e.g. boat sales), while others may be impacted negatively (e.g. restaurants)
 - Eating out vs. picnic at lake
 - Geographical (some business districts not close to lake – e.g., Washington, GA)

Assessing the Impact of Changing Lake Levels on the Region

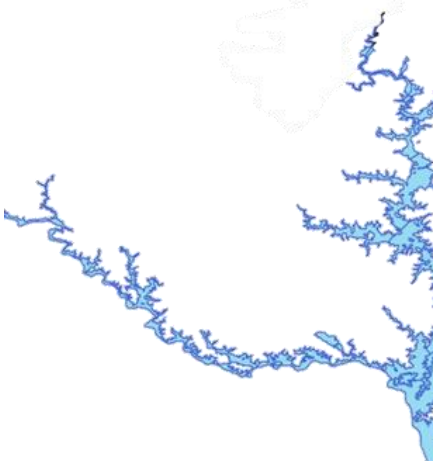


The REDYN Economic Model

- Input/Output (I/O) model
- Computes inflows and outflows of goods, services, and income based on historically established inter-industry and interregional linkages
- Considers distance to market and transportation costs
- Returns estimates at county, multi-county, state, or multi-state level

Economic Impact Analysis

- Results from regression analysis used with the REDYN model to estimate the total economic impact of changing lake levels on adjacent counties.
- Economic impacts include “spillover” effects:
 - Direct effects (jobs and income created by Bob’s Fishin’ Supply)
 - Indirect effects (impact on Bob’s vendors/suppliers)
 - Induced effects (broader impacts on community from consumer spending by employees at Bob’s and his suppliers)

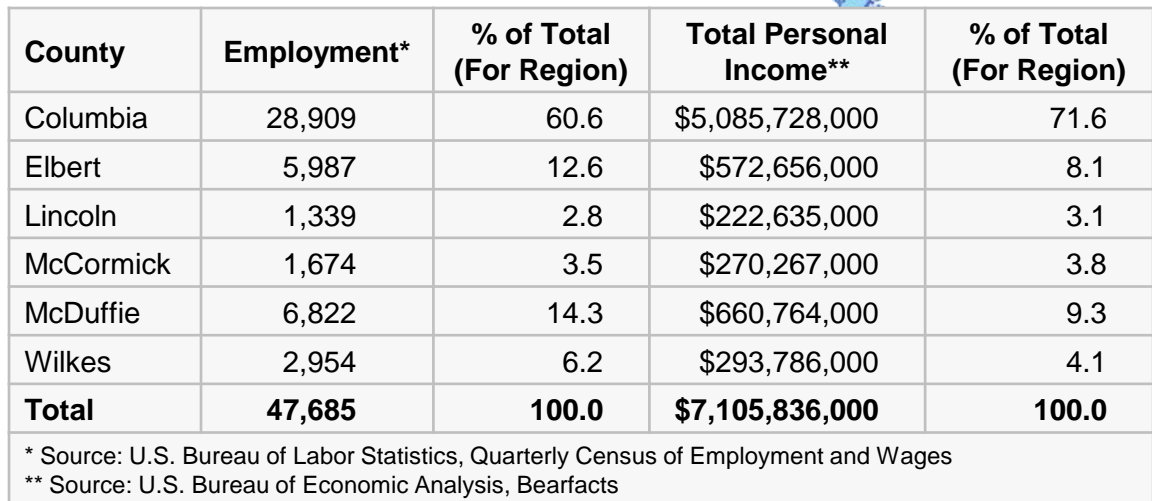


County	Employment*	% of Total (For Region)	Total Personal Income**	% of Total (For Region)
Anderson	56,604	42.3	\$5,854,207,000	45.6
Oconee	21,491	16.0	\$2,378,718,000	18.5
Pickens	34,209	25.5	\$2,503,832,000	19.5
Franklin	6,618	4.9	\$633,103,000	4.9
Hart	5,994	4.5	\$671,890,000	5.2
Stephens	9,043	6.8	\$793,157,000	6.2
Total	133,959	100.0	\$12,834,907,000	100.0

* Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

** Source: U.S. Bureau of Economic Analysis, Bearfacts

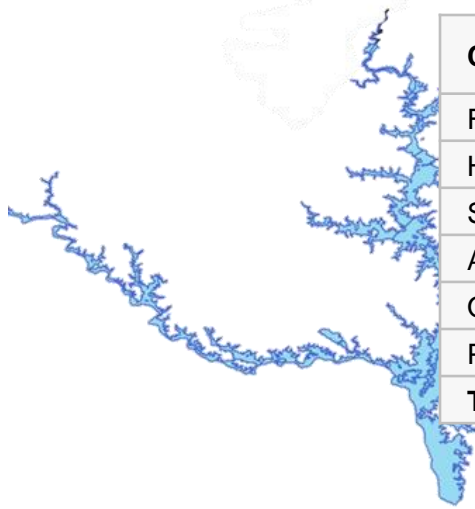
Total Employment and Personal Income



County	Employment*	% of Total (For Region)	Total Personal Income**	% of Total (For Region)
Columbia	28,909	60.6	\$5,085,728,000	71.6
Elbert	5,987	12.6	\$572,656,000	8.1
Lincoln	1,339	2.8	\$222,635,000	3.1
McCormick	1,674	3.5	\$270,267,000	3.8
McDuffie	6,822	14.3	\$660,764,000	9.3
Wilkes	2,954	6.2	\$293,786,000	4.1
Total	47,685	100.0	\$7,105,836,000	100.0

* Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

** Source: U.S. Bureau of Economic Analysis, Bearfacts

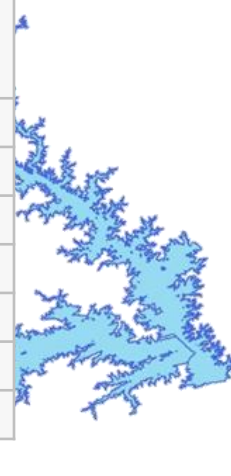


County	Employment (FTEs per mo.)	Output (\$ per mo.)	Disposable Inc. (\$ per mo.)	Net Revenue (\$ per mo.)
Franklin	+0.6	+\$399,128	+\$74,564	+\$8,106
Hart	+0.5	+\$318,522	+\$148,975	+\$15,754
Stephens	-2.0	-\$1,001,146	-\$346,130	-\$38,085
Anderson	+15.6	+\$10,846,124	+\$3,801,467	+\$494,876
Oconee	-5.0	-\$2,318,062	-\$764,989	-\$85,500
Pickens	+0.2	+\$34,857	+\$137,045	+\$17,666
Total	+9.5	+\$8,279,424	+\$3,050,932	+\$412,817

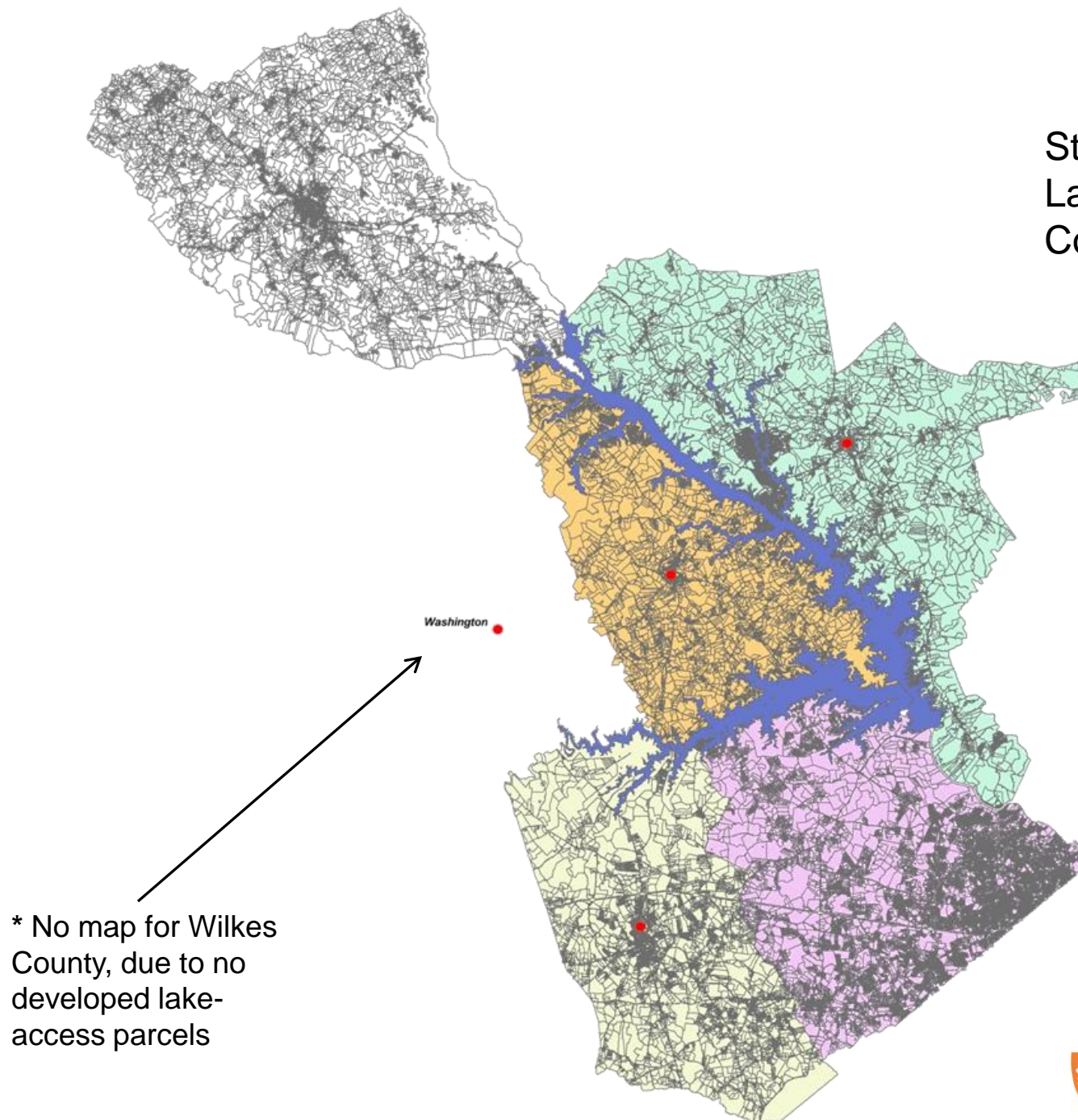


Median Monthly Economic Impact of a One-Foot Increase in Lake Level

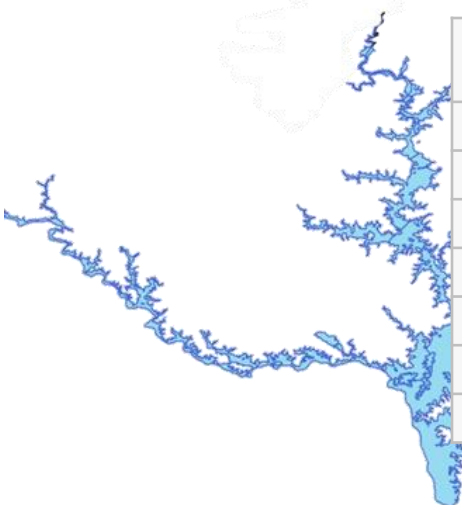
County	Employment (Net jobs per mo.)	Output (\$ per mo.)	Disposable Inc. (\$ per mo.)	Net Revenue (\$ per mo.)
Columbia	+24.9	+\$13,418,000	+\$3,652,000	+\$454,000
Elbert	0.0	+\$192,000	+\$66,000	+\$6,000
Lincoln	+6.1	+\$3,608,000	+\$1,516,000	+\$150,000
McCormick	0.0	+\$19,000	+\$56,000	+\$5,000
McDuffie	+8.0	+\$4,949,000	+\$1,834,000	+\$194,000
Wilkes	-1.6	-\$971,000	-\$168,000	-\$14,000
Total	+37.5	+\$21,215,000	+\$6,952,000	+\$796,000



Study Region:
Lake Thurmond
Counties




* No map for Wilkes
County, due to no
developed lake-
access parcels



County	Employment (FTEs)	Output (2010 \$)	Disposable Inc. (2010 \$)	Net Revenue (2010 \$)
Franklin	-13	-\$8,135,131	-\$1,691,845	-\$161,433
Hart	-7	-\$6,183,457	-\$2,797,030	-\$302,592
Stephens	+39	+\$19,274,702	+\$6,794,129	+\$733,677
Anderson	-298	-\$209,602,122	-\$74,864,817	-\$9,494,545
Oconee	+96	+\$44,393,422	+\$15,157,791	+\$1,635,291
Pickens	0	-\$576,276	-\$2,396,853	-\$336,777
Total	-184	-\$160,828,861	-\$59,798,625	-\$7,926,380

Total Estimated Economic Impact of Low Lake Levels (April 2007 – Dec. 2008)



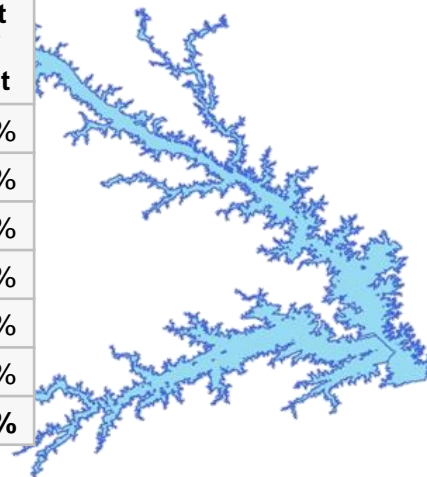
County	Employment (Net Jobs)	Output (2010 \$)	Disposable Inc. (2010 \$)	Net Revenue (2010 \$)
Columbia	-333	-\$182,921,000	-\$49,849,000	-\$6,220,000
Elbert	0	-\$2,652,000	-\$897,000	-\$86,000
Lincoln	-82	-\$48,953,000	-\$20,635,000	-\$2,082,000
McCormick	0	-\$221,000	-\$755,000	-\$68,000
McDuffie	-106	-\$67,069,000	-\$24,953,000	-\$2,669,000
Wilkes	+21	+\$13,156,000	+\$2,284,000	+\$194,000
Total	-500	-\$288,660,000	-\$94,805,000	-\$10,930,000

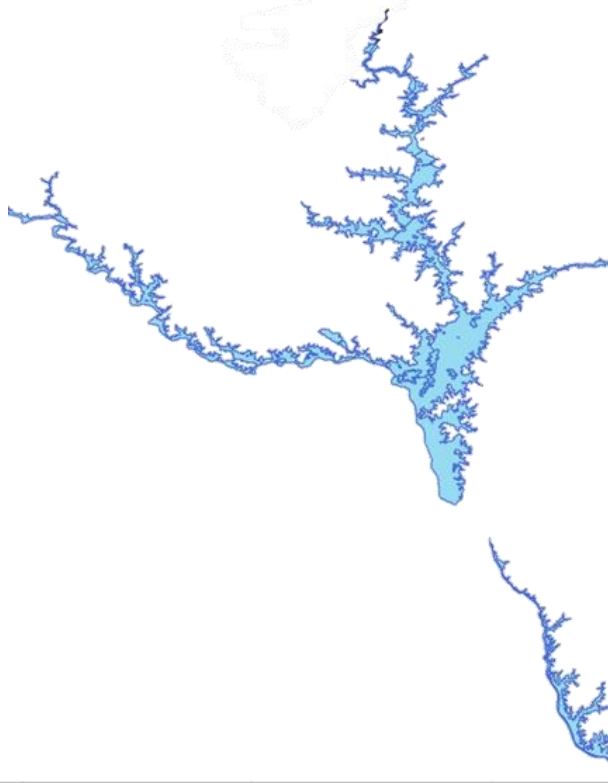


County	Est. Output Impact (2010 \$)	Output Impact as Percent of County Output
Franklin	-\$8,135,131	-0.53%
Hart	-\$6,183,457	-0.37%
Stephens	+\$19,274,702	+0.97%
Anderson	-\$209,602,122	-1.50%
Oconee	+\$44,393,422	+0.81%
Pickens	-\$576,276	-0.01%
Total	-\$160,828,861	-0.53%

Economic Impacts in Context

County	Est. Output Impact (2010 \$)	Est. Total County Output (2010 \$)	Output Impact as Percent of County Output
Columbia	-\$182,921,000	\$5,071,239,000	-3.6%
Elbert	-\$2,652,000	\$1,713,819,000	-0.2%
Lincoln	-\$48,953,000	\$267,852,000	-18.3%
McCormick	-\$221,000	\$302,175,000	-0.1%
McDuffie	-\$67,069,000	\$1,436,830,000	-4.7%
Wilkes	+\$13,156,000	\$670,985,000	+2.0%
Total	-\$288,660,000	\$9,462,899,000	-3.1%





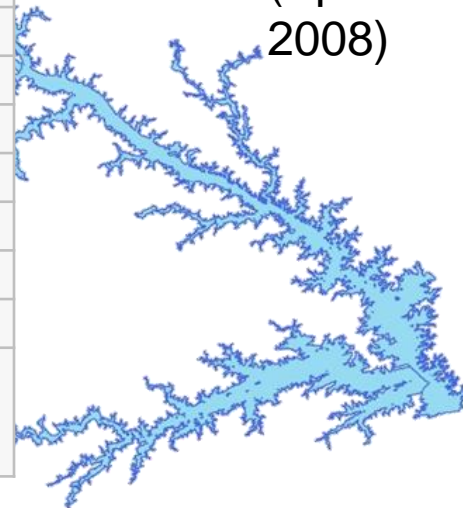
County	Transactions Gained/Lost	Transactions Over Period	Gained/Lost % of Total^
Franklin	-5	34	-15.4%
Hart	-5	15	-36.2%
Stephens	-9	45	-12.4%
Anderson	-32	1,233	-2.6%
Oconee	-8	277	-2.8%
Pickens	0.0	1	0.0%
Total	-56	1,605	-3.5%

^ Stated as a percentage of actual transactions plus estimated lost transactions.

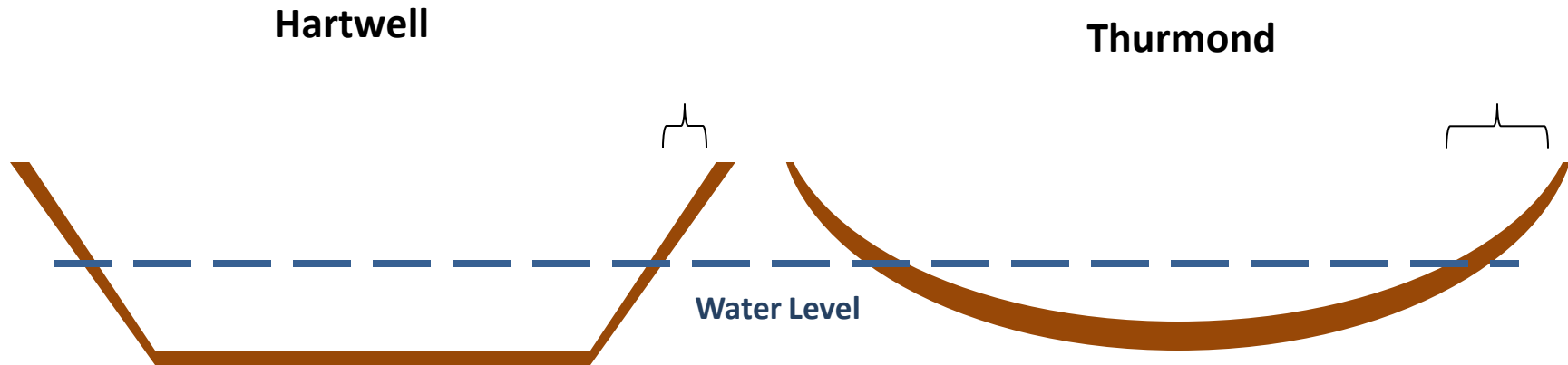
County	Transactions Gained/Lost	Actual Transactions Over Period	Gained/Lost % of Total^
Columbia*	-87	12	-87.9%
Elbert	-7	5	-57.2%
Lincoln**	-4	114	-3.3%
McCormick**	-5	85	-5.9%
McDuffie	-1	11	-5.6%
Wilkes***	N/A	N/A	N/A
Total	-104	227	-31.4%

^ Stated as a percentage of actual transactions plus estimated lost transactions.
 * Data only available beginning Jan. 2003.
 ** Data only available beginning Jan. 2000.
 *** No lake-access parcels are located in Wilkes County.

Drought Impact on Lake-access Real Estate Sales (April 2007 – December 2008)



Thurmond vs. Hartwell



Lake Thurmond's banks are shallower than Hartwell's; therefore, equivalent changes in lake level will result in more "red bank" on Thurmond.

This may partly account for disparate economic impacts observed between the two lakes.



Lake Level and Property Values

Hedonic Models

- Hedonic pricing is based on the idea that the value of a house is a function of the value of individual attributes that comprise the house, and proximity to such amenities as schools, parks, or lakes. The price of a house (P_h) can be written as:

$$P_h = f(S_j, N_k, W_m)$$

S_j = Structural characteristics

N_k = Neighborhood characteristics

W_m = Water level

Water as an Amenity

- Proximity to water source and the size of lake (water) frontage increase property values. (Brown and Pollakowski, 1977; D'Arge and Shogren, 1989; Darling, 1973; David, 1968; Feather et al., 1992; Knetsch, 1964; Lansford and Jones, 1995).
- Lansford and Jones (1995): A home's value falls rapidly as the distance from a lake increases.

Water Level and Recreation Value

- Lansford and Jones (1995) ~ 87 percent of the recreation and amenity value of the lake can be captured in the sale price of homes that are within 2000 feet of the shoreline.
- Scenic view, waterfront location and water level are all statistically significant contributors to enhanced property values.

Model Results

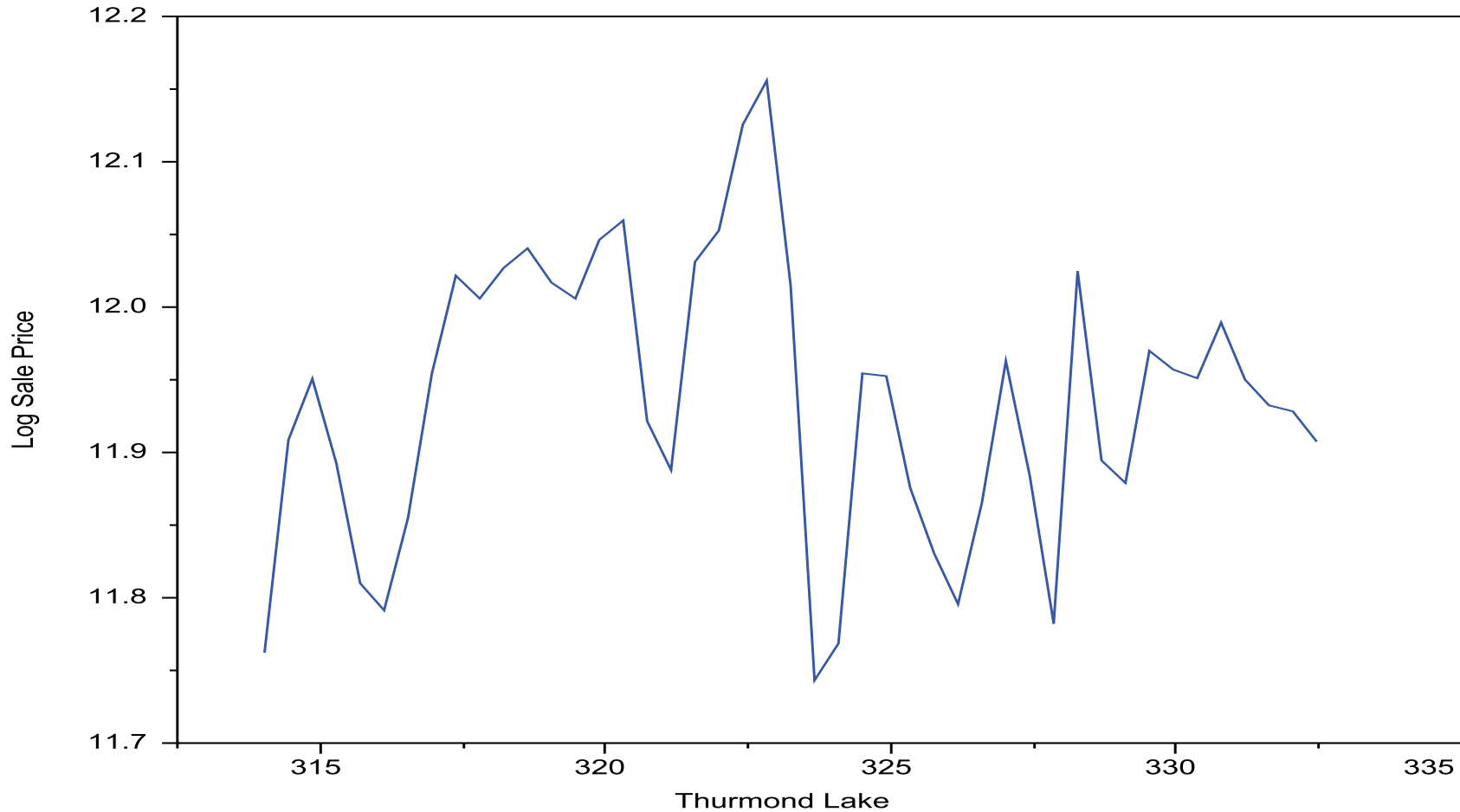
Methodology: Log-linear framework

Results reveal a non-linear relationship between lake level and housing value.

Columbia, Elbert, and Lincoln, counties had sufficient data for this analysis.

Columbia, County Georgia had the most real estate transactions and is the most economically diverse of the six counties

This is not Linear!



Columbia County Model Results

- Approximately 27% of the variation in housing values are explained by this model.
- The Global F Statistic reveals the overall model results are significant

Summary of Fit	
R-square	0.2750
Adjusted R-square	0.2743
Observations	26022
Prob > F	<.0001
F Ratio	428.576

Year	Lakefront Real Estate Transactions
2003	9
2004	13
2005	18
2006	10
2007	8
2008	3
2009	11
2010	10

This model contains 26,022 real estate sales observations from January 2003 to December 2010. Of these 26,022 sales, 76 were lakefront sales or .29% of total sales.

Marginal Impacts

- Log Linear estimates are interpreted as percentage impacts.
- Results reveal significant polynomial lake level variables and an interaction term with average temperature.

	Percentage Impact
Average	-.3467
Maximum	-1.5806

These results confirm at the lowest levels below full pool, individual real estate prices in Columbia County may decline by as much as 1.5 percent.

At lake levels at 7 feet below full pool and greater, declines in lake level at any of the given temperatures result in a negative percentage impact on home sales price.

Summary and Future Research

- Lake Level has a statistically significant economic impact in these counties.
- The magnitude of the impact and its relationship to economic activity is unique to each county.
- Each county has its own unique characteristics that help determine the relationship with lake related activity.
- State, Regional, and National economic activity, while controlled for to some extent, make an even bigger impact on county economic activity.
- Future research:
 - Spatial variables like distance to lake or river
 - Add additional years of data to the model
 - Add additional neighborhood characteristics to these models
 - Acquire data on the other three counties



STI serves business, government, and community constituents through objective research, outstanding graduate education, and public service programs for the state and region.

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